

3. "*Cystechinus crassus*, a new Species from the Radiolarian Marls of Barbadoes; and the evidence it affords as to the Age and Origin of those Deposits." By J. W. Gregory, Esq., F.G.S.

In this paper the discovery of a species of *Cystechinus* from the Radiolarian earth of Barbadoes was recorded. The specimen is now preserved in the National Collection, South Kensington. The form was described and distinguished from the three modern species which were found during the 'Challenger' Expedition. The latter have shown that the bathymetrical range of the genus is from 1050 to 2225 fathoms.

The Author gave proofs that the specimen really came from the Radiolarian marl, and not from the overlying Coralline limestone, and after discussing the age of the marl, as inferred by Prof. E. Forbes from an examination of the Mollusca, and by Prof. Haeckel after studying the Radiolaria, gave his reasons for supposing that it is in reality more modern than these authors supposed, and may be referred to the Pliocene or Pleistocene.

Though *Cystechinus crassus* possessed plates of greater thickness than those of the previously described species, the ambulacra were apetaloid, and the Author concluded that though an inhabitant of seas of less depth than those in which the modern forms occur, it may be fairly considered to have been a dweller in deep seas, and to indicate that the Radiolarian deposit is a true deep-sea ooze.

MISCELLANEOUS.

A new Marine Larva and its Affinities.

By J. WALTER FEWKES*.

[Plate VII. fig. 4.]

THERE are in the waters of the Atlantic, near the coast of the United States, a large number of marine larvæ, very different from characteristic larvæ of the European seas, of the adult state of which the naturalist is in profound ignorance †. The adults of these larvæ may have been described and figured, and may be well known, but from the fact that many young marine animals are so different from the adults their relationship is unsuspected, although both mature and immature stages are known. It is certainly a desirable thing to trace these larvæ to their parents as a part of the great study of the metamorphosis of marine animals. This special line of zoological work has many attractions to an earnest band of working naturalists,

* From 'The Microscope' for June 1888.

† Conversely also we are ignorant of the young of a much larger number of adult animals of our seas and bays.

and offers remarkable possibilities for discovery. The same branch of marine research has been prosecuted for many years on the shores of the North Sea and the Mediterranean, and a large number of larvæ, known to be such, but which have as yet not been raised into adults, have been described and figured. This provisional nomenclature of a larval animal known to be such has been a means of attracting the attention of other naturalists to the larva, and in many instances has led to the discovery of the adult.

The larval forms of marine animals of the coast of New England are varied in form and rich in number. They are as different from those of Europe as the fauna of our bays and sounds is different from the European. We have few descriptions of these larval animals from our waters, and so different are they from the European that it is hard, almost impossible, to identify them. Shall we give these undoubted larvæ new names which shall be provisional, or shall we delay publication until we have traced them to the adults? Something is to be said in favour of both courses; but a description of a new stage of a larva by one observer may attract the attention of another naturalist, and fit into a series of observations otherwise complete, thus leading to a discovery which neither alone could possibly make from the material at his command.

The object of the present paper is to record a brief notice of an unknown larva of peculiar morphology found in the Bay of Fundy. Its general affinities are apparent and will be spoken of later; but its special relationship is unknown. It is hoped that this mention may meet the eyes of those interested in the study of the metamorphosis of the marine animals of the United States, and attract the attention of some one who may be able to add to our limited knowledge of it. No more interesting questions can at present be raised, so far as the determination of the facies of our marine fauna is concerned, than those which deal with the identification of the larval forms of life which inhabit the populous waters of our coast.

A number of naturalists have expressed the belief that the larvæ of some Annelids are closely related to the young of certain Bryozoa, and have supposed that the phylogenetic history of the two groups is closely interwoven. A young Chætopod, which combines many characters of the larvæ of the Bryozoa, is called *Mitraria*. While several of the features which distinguish this larva are undoubtedly secondary modifications and are of little phylogenetic importance, the general form of *Mitraria* is believed to approach closely the prototype or ancestral form of both the Chætopods and the Bryozoa, if not of the Brachiopods and other related groups. It is the purpose of the present paper to consider the form of a larva allied to *Mitraria* from the Bay of Fundy, and to call attention to the interest attached to the study of this interesting animal.

A true *Mitraria* has never been described from the coasts of North America. I have found specimens of this genus at the Bermudas and at Santa Cruz, California; but neither of these have been figured or described. No other naturalist has recorded *Mitraria* from American waters, and but few have found it in European seas.

It is consequently with great pleasure that I am able to figure for the first time a beautiful *Mitraria*-like larva, which is found in abundance in the cold waters of the Bay of Fundy. This larva does not occur south of Cape Cod, although it is represented in the waters of Massachusetts Bay at Provincetown, Mass. It is different in form from the European representative, of which, in truth, considering the part which it has played in discussion of the affinities of larval forms of animals, too little is known.

My new larva was first taken by means of the drag-net or tow-net in the summer of 1886. I first found it at Frye's Island, New Brunswick, and afterwards it was taken at Grand Manan. The larva occurred in countless multitudes in July, and later decreased in numbers, but was collected far into August. Later than August, however, I have never seen *Mitraria* in the nets, although it may and probably does last long into the autumn. The following description will give an idea of the general contour and structure of the body of my new larva.

The body (Pl. VII. fig. 4) is hat-shaped, with a narrow rim, gelatinous and transparent. When contracted the equatorial rim or belt of the worm is drawn to the body, imparting a spherical form to the animal.

There are two ciliated regions of the body. One of these is situated at the apex of the larva, forming a small tuft of cilia, shown in fig. 4. The second ciliated region is found on the rim of the larva, forming a belt skirting the outer border. This second region or ciliated belt is conspicuous on account of the masses of reddish pigment shown in the figure.

Hanging down from the pole of the larva, opposite the apical tuft of cilia, there is a bifid protuberance, from which arise two fan-shaped bundles of provisional setæ. These setæ resemble the embryonic setæ so common in larval Chaetopods. They can be drawn together or separated, and are always very conspicuous. Above the protuberances from which the spines arise there is a spherical darkly pigmented body easily seen through the walls of the larva.

Under the apex of the larva there is a thickening of the epiblast which is connected with the marginal belt by means of a fine thread, shown in fig. 4. The apical tuft of cilia rises from this epiblastic thickening. The digestive system of our larva is very simple, and its yellow walls are readily seen through the sides of the body. It consists of a long tubular œsophagus, the inner wall of which is richly ciliated, opening into an elongated stomach, simple and without cilia*. The mouth lies just inside the ciliated rim or belt, and is separated from the stomach by the globular body, at the base of the spine-bearing protuberance on the lower pole of the larva.

The larva is, when expanded, from .15 to .2 millim. in diameter.

Only a single stage in the growth of this larva was found, and consequently its adult form is unknown.

* No external opening of the stomach through an intestine was observed.

The question now arises, What are the affinities of the curious larva described above? It has Chætopod, Brachiopod, and Bryozoan features, and may be supposed to resemble the archetype or ancestral form of these three groups.

I was at first led to regard it as the young of the genus *Terebratulina**, a Brachiopod common in the Bay of Fundy. It differs, however, very considerably from any figure of a Brachiopod which I have ever seen, although in some features it recalls *Argiope*. It also resembles somewhat *Cyclopelma*, the young of *Loxosoma*, often-times regarded a Bryozoan. Its closest affinities appear to me to be with *Mitraria*, a larva which Metschnikoff has already shown to belong to the developmental stages of a Chætopod annelid. It differs, however, considerably from *Mitraria*, and its true affinities, whether with Brachiopods or Chætopods, must be discovered by later investigation.

Balfour, in his well known 'Comparative Embryology,' has sagaciously suggested that *Pilidium*, a larval form of certain Nemertean worms, reproduces the larval prototype in the course of its conversion into a bilateral form. Other naturalists have carried the idea still further, and find the *Pilidium* to represent a definite stage in the development of several groups of marine larvæ. While I cannot subscribe to many of the statements made by the several naturalists who have written on this subject, it seems to me not improbable that Balfour's interpretation of the signification of the *Pilidium* as a definite ancestral stage may be considerably amplified, and that the *Pilidium* or a *Pilidium*-like larva may be recognized in other groups than that of the Nemertean. The well-developed *Pilidium* is probably more or less modified by secondary characters; but the essential form of the young *Pilidium* is probably ancestral for several groups of marine animals.

Following the *Pilidium*-stage in the groups of Brachiopods, Chætopods, and Bryozoa is one which we may call the *Mitraria*-stage. It is thought to be assumed, possibly in a modified form but with certain general features which are characteristic, by the young of certain genera of each of the three groups mentioned.

It is the opinion of the author that while the beautiful *Mitraria*-like larva here figured has many secondary characters which are not ancestral for the Bryozoa, Chætopoda, and Brachiopoda, it also has features which are phylogenetic for the three groups. Considering, then, the *Pilidium* as a stage following the gastrula, the next stage in these groups may not be unlike the *Mitraria*. This stage, which may be looked upon as a common one in the three groups named, adds to the gastrula, among other features, the following:—1. An apical tuft of cilia mounted upon an epiblastic thickening; 2. A mouth surrounded by a ciliated rim; 3. A protuberance near the mouth from which arise embryonic setæ.

* It cannot be asserted dogmatically that my new larva is not a Brachiopod; but it differs essentially from the larval Brachiopods which have been described.

While undoubtedly some of the characters of the *Mitraria* indicated above are secondary and special adaptations of limited distribution, it is believed that the majority are ancestral for Brachiopods, Bryozoa, and Chaetopods, and that the common ancestor of these three groups is most closely preserved to us in the genus *Mitraria*. I therefore suggest as a name for the common ancestor of the Brachiopods, Chaetopods, and Bryozoa that of *Mitraria*, which up to the present is applied simply to the larval form of a single genus of Chaetopoda.

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Aspidophryxus Sarsii, Giard and Bonnier.

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The July 'Annals' contains a translation of the description of this parasitic Isopod, which I had placed in the authors' hands. It is, however, erroneously stated that the *Erythrops micropthalma* upon which it occurred was "dredged by G. O. Sars himself upon the Norwegian coast," and the *Aspidophryxus* is said to "have been determined as *A. peltatus* by G. O. Sars." I know not how the authors can have fallen into this error. The host with its parasite was dredged by myself in 1882 in Solems Fiord, Florø, Norway, among dead *Zostera* in 5 fathoms, and was named by me *A. peltatus*, as it appeared to be that species when still in the host, and while therefore those small differences on which Messrs. Giard and Bonnier have felt justified in establishing a new species were not visible. I have thought it just to correct the statement that my friend Prof. G. O. Sars had identified it as his *A. peltatus*.

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The Sepiolaræ of the French Coasts. By M. A. GIARD.

The author refers to the two species supposed to be most abundant in the Pas de Calais, namely *S. atlantica* and *S. Rondeleti*, and notes that since the researches of Peters (in 1842) it has been supposed that the ink-bag in *S. Rondeleti* presents different forms at different seasons, being trilobate at the time of breeding and simple during the rest of the year. The modifications undergone by the organ in this respect were regarded by Peters as so important that at the first glance they might be regarded as of generic value. Girod (in 1882) confirmed Peters's opinion and extended it further to *S. atlantica*.

Steenstrup, in a memoir on the Mediterranean species of *Sepiolaræ* (Overs. Kongl. Dan. Vidensk. Selsk. Forh. 1887, pp. 47-56), describes the results of an investigation of a great number of types from various localities and collected at different seasons, and shows